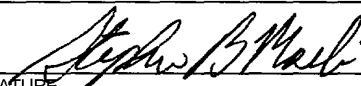


FORM PTO-1390 (Modified) (REV 5-93)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NUMBER	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				065691-0245	
INTERNATIONAL APPLICATION NO. PCT/FR00/00161		INTERNATIONAL FILING DATE January 25, 2000		U.S. APPLICATION NO. (If known, see 37 C.F.R. 1.51) APPL. NO. 09/890140	
TITLE OF INVENTION DEVICE FOR DIFFUSING STERILE AIR		PRIORITY DATE CLAIMED January 26, 1999			
APPLICANT(S) FOR DO/EO/US Didier Beudon and Pierre BRIDENNE					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:					
1.	<input checked="" type="checkbox"/>	This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.			
2.	<input type="checkbox"/>	This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.			
3.	<input checked="" type="checkbox"/>	This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).			
4.	<input checked="" type="checkbox"/>	A proper Demand for International Preliminary Examination was made by the 19 th month from the earliest claimed priority date.			
5.	<input checked="" type="checkbox"/>	A copy of the International Application as filed (35 U.S.C. 371(c)(2))			
	<input checked="" type="checkbox"/>	is transmitted herewith (required only if not transmitted by the International Bureau).			
	<input type="checkbox"/>	has been transmitted by the International Bureau.			
	<input type="checkbox"/>	is not required, as the application was filed in the United States Receiving Office (RO/US)			
6.	<input checked="" type="checkbox"/>	A translation of the International Application into English (35 U.S.C. 371(c)(2)).			
7.	<input checked="" type="checkbox"/>	Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))			
	<input checked="" type="checkbox"/>	are transmitted herewith (required only if not transmitted by the International Bureau).			
	<input type="checkbox"/>	have been transmitted by the International Bureau.			
	<input type="checkbox"/>	have not been made; however, the time limit for making such amendments has NOT expired.			
	<input type="checkbox"/>	have not been made and will not be made.			
8.	<input checked="" type="checkbox"/>	A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).			
9.	<input type="checkbox"/>	An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).			
10.	<input checked="" type="checkbox"/>	A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).			
11.	<input type="checkbox"/>	Applicant claims small entity status under 37 CFR 1.27.			
Items 12. to 17. below concern other document(s) or information included:					
12.	<input type="checkbox"/>	An Information Disclosure Statement under 37 CFR 1.97 and 1.98.			
13.	<input type="checkbox"/>	An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.			
14.	<input checked="" type="checkbox"/>	A FIRST preliminary amendment.			
	<input type="checkbox"/>	A SECOND or SUBSEQUENT preliminary amendment.			
15.	<input type="checkbox"/>	A substitute specification.			
16.	<input type="checkbox"/>	A change of power of attorney and/or address letter.			
17.	<input type="checkbox"/>	Other items or information			

RECEIVED 26 JUL 2001

U.S. APPLICATION NO. (if known, see 37 CFR 1.400) Unassigned 097890140		INTERNATIONAL APPLICATION NO. PCT/FR00/00161		ATTORNEY'S DOCKET NUMBER 065691-0245	
18. <input checked="" type="checkbox"/> The following fees are submitted:				CALCULATIONS	
Basic National Fee (37 CFR 1.492(a)(1)-(5): Search Report has been prepared by the EPO or JPO.....\$860.00					
International preliminary examination fee paid to USPTO (37 CFR 1.482).....\$690.00					
No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2))\$710.00					
Neither international preliminary examination fee (37 CFR 1.482) nor International search fee (37 CFR 1.445(a)(2)) paid to USPTO \$1,000.00					
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4)\$100.00					
ENTER APPROPRIATE BASIC FEE AMOUNT =				\$860.00	
Surcharge of \$130.00 for furnishing the oath or declaration later than 20 Months from the earliest claimed priority date (37 CFR 1.492(e))					
Claims	Number Filed	Included in Basic Fee	Extra Claims	Rate	
Total Claims	19	- 20	= 0	x \$18.00	\$0.00
Independent Claims	1	- 3	= 0	x \$80.00	\$0.00
Multiple dependent claim(s) (if applicable)				\$270.00	
TOTAL OF ABOVE CALCULATIONS =				\$860.00	
Reduction by 1/2 for filing by small entity, if applicable.				\$0.00	
SUBTOTAL =				\$860.00	
Processing fee of \$130.00 for furnishing English translation later the 20 months from the earliest claimed priority date (37 CFR 1.492(f). +					
TOTAL NATIONAL FEE =				\$860.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +					
TOTAL FEES ENCLOSED =				\$860.00	
				Amount to be: refunded \$	
				charged \$	
<p>a. <input checked="" type="checkbox"/> A check in the amount of \$860.00 to cover the above fees is enclosed.</p> <p>b. <input type="checkbox"/> Please charge my Deposit Account No. <u>19-0741</u> in the amount of \$0.00 to the above fees. A duplicate copy of this sheet is enclosed.</p> <p>c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>19-0741</u>. A duplicate copy of this sheet is enclosed.</p>					
<p>NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.</p>					
<p>SEND ALL CORRESPONDENCE TO:</p> <p>Foley & Lardner Washington Harbour 3000 K Street, N.W., Suite 500 Washington, D.C. 20007-5109</p>					
				<p>SIGNATURE </p>	
				NAME STEPHEN B. MAEBIUS	
REGISTRATION NUMBER 35,264					

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Didier Beudon et al.

Entitled: DEVICE FOR DIFFUSING STERILE AIR

Serial No.: To be assigned

Date Filed: Concurrently

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination of the present application, Applicant's respectfully requests that the above-identified application be amended as follows:

In the Claims:

In accordance with 37 C.F.R. § 1.121(c) (3), please substitute for pending claims 3, 5, 7-9, 11-13, 15 and 18 with the following clean version of the claims. The changes to these claims are shown explicitly in the attached "Marked Up Version of Claims."

3. (Amended) The device as claimed in claim 1, characterized in that said wall is an end wall of another similar device with which it forms a set of devices for the close protection of products arranged on a worktop of large length, which are sensitive to the contamination conveyed by the ambient environment, said devices being abutted without mechanical fixing therebetween.
5. (Amended) The device as claimed in claim 1, characterized in that it comprises at least one sheath (101, 102, 103) made of a flexible material diffusing a sterile air stream in a vertical direction substantially perpendicular to said worktop (12), said sheath being formed of a quasi-leaktight upper wall and of a porous lower wall

made of a perforated flexible material, extending longitudinally along the axis (X) of the sheath and delimiting between them a sterile air supply duct, and said end of the sheath being formed by a porous wall made of a perforated flexible material.

7. (Amended) The device as claimed in claim 5, characterized in that the perforated flexible material constituting the porous lower longitudinal wall and said end wall of the sheath is a synthetic fabric such as a polypropylene or polyester fabric.
8. (Amended) The device as claimed in claim 5, characterized in that each longitudinal edge of the quasi-leaktight upper longitudinal wall of said sheath is continued by a skirt (104, 105) which extends vertically toward the worktop (12) and which constitutes a means of diffusion of sterile air at high velocity relative to the porous lower longitudinal wall of the sheath which diffuses the sterile air at low velocity.
9. (Amended) The device as claimed in claim 5, characterized in that it comprises a plurality of sheaths (101, 102, 103) made of a flexible material, juxtaposed so that their axes (X) are parallel and arranged in one and the same plane parallel to the worktop, said sheaths (101, 102, 103) covering the entire width of said worktop (12).
11. (Amended) The device as claimed in claim 8, characterized in that the two skirts (104, 105) are of the same length and extend up to the immediate proximity of the worktop.
12. (Amended) The device as claimed in claim 8, characterized in that the two skirts (104, 105) have different lengths, a long skirt (104) whose length is approximately equal to the height allowed for between the axis of the sheath and the worktop and a short skirt (105) whose length is approximately equal to half the length of the long skirt.
13. (Amended) The device (200) as claimed in claim 1, characterized in that it comprises at least one ventilation nozzle (201) arranged on a longitudinal edge of

said worktop (12) and able to produce directed toward said products a sterile air stream in a horizontal general direction substantially parallel to said worktop, said ventilation nozzle (201) comprising at its outlet an air diffuser (202) made of a perforated material provided with upper and lower parts which produce an anti-inductive air flow whose velocity of diffusion exhibits a component normal to the worktop, said end (201a, 201b) of said ventilation nozzle being formed by a wall made of a perforated material.

15. (Amended) The device as claimed in claim 13, characterized in that the ventilation nozzle comprises at the level of said porous end (201b), on its upper surface extending horizontally up to its outlet, a strip (201c) of perforated material forming a sterile air flow directed essentially vertically away from the worktop.
18. (Amended) The device as claimed in claim 1, characterized in that it comprises a cubicle (300) positioned above the worktop (12), supplied with sterile air and having a porous lower wall (301) for diffusing sterile air in a vertical direction substantially perpendicular to the worktop (12), said porous wall being made of perforated sheet and exhibiting a profile such that it ensures central diffusion of sterile air at low velocity bordered on each side by a diffusion of sterile air at high velocity, said end of the cubicle being formed by a wall comprising at least one porous zone (302) made of a perforated material extending over the entire width of said cubicle and rising from the lower edge of said cubicle to a certain determined height.

REMARKS

Applicant respectfully requests that the foregoing amendments be made prior to examination of the present application.

Respectfully submitted,

Date July 26, 2001

By 

FOLEY & LARDNER
3000 K Street, N.W., Suite 500
Washington, D.C. 20007-5109
Telephone: (202) 672-5569
Facsimile: (202) 672-5399

Stephen B. Maebius
Attorney for Applicant
Registration No. 35,264

MARKED UP VERSION OF AMENDED CLAIMS

3. (Amended) The device as claimed in [one of claims 1 or 2] claim 1, characterized in that said wall is an end wall of another similar device with which it forms a set of devices for the close protection of products arranged on a worktop of large length, which are sensitive to the contamination conveyed by the ambient environment, said devices being abutted without mechanical fixing therebetween.
5. (Amended) The device as claimed in [any one of claims 1 to 4] claim 1, characterized in that it comprises at least one sheath (101, 102, 103) made of a flexible material diffusing a sterile air stream in a vertical direction substantially perpendicular to said worktop (12), said sheath being formed of a quasi-leaktight upper wall and of a porous lower wall made of a perforated flexible material, extending longitudinally along the axis (X) of the sheath and delimiting between them a sterile air supply duct, and said end of the sheath being formed by a porous wall made of a perforated flexible material.
7. (Amended) The device as claimed in [one of claims 5 or 6] claim 5, characterized in that the perforated flexible material constituting the porous lower longitudinal wall and said end wall of the sheath is a synthetic fabric such as a polypropylene or polyester fabric.
8. (Amended) The device as claimed in [one of claims 5 to 7] claim 5, characterized in that each longitudinal edge of the quasi-leaktight upper longitudinal wall of said sheath is continued by a skirt (104, 105) which extends vertically toward the worktop (12) and which constitutes a means of diffusion of sterile air at high velocity relative to the porous lower longitudinal wall of the sheath which diffuses the sterile air at low velocity.
9. (Amended) The device as claimed in [any one of claims 5 to 7] claim 5, characterized in that it comprises a plurality of sheaths (101, 102, 103) made of a flexible material, juxtaposed so that their axes (X) are parallel and arranged in one

and the same plane parallel to the worktop, said sheaths (101, 102, 103) covering the entire width of said worktop (12).

11. (Amended) The device as claimed in [one of claims 8 or 10] claim 8, characterized in that the two skirts (104, 105) are of the same length and extend up to the immediate proximity of the worktop.
12. (Amended) The device as claimed in [one of claims 8 or 10] claim 8, characterized in that the two skirts (104, 105) have different lengths, a long skirt (104) whose length is approximately equal to the height allowed for between the axis of the sheath and the worktop and a short skirt (105) whose length is approximately equal to half the length of the long skirt.
13. (Amended) The device (200) as claimed in [any one of claims 1 to 4] claim 1, characterized in that it comprises at least one ventilation nozzle (201) arranged on a longitudinal edge of said worktop (12) and able to produce directed toward said products a sterile air stream in a horizontal general direction substantially parallel to said worktop, said ventilation nozzle (201) comprising at its outlet an air diffuser (202) made of a perforated material provided with upper and lower parts which produce an anti-inductive air flow whose velocity of diffusion exhibits a component normal to the worktop, said end (201a, 201b) of said ventilation nozzle being formed by a wall made of a perforated material.
15. (Amended) The device as claimed in [one of claims 13 or 14] claim 13, characterized in that the ventilation nozzle comprises at the level of said porous end (201b), on its upper surface extending horizontally up to its outlet, a strip (201c) of perforated material forming a sterile air flow directed essentially vertically away from the worktop.
18. (Amended) The device as claimed in [one of claims 1 to 4] claim 1, characterized in that it comprises a cubicle (300) positioned above the worktop (12), supplied with sterile air and having a porous lower wall (301) for diffusing sterile air in a vertical

direction substantially perpendicular to the worktop (12), said porous wall being made of perforated sheet and exhibiting a profile such that it ensures central diffusion of sterile air at low velocity bordered on each side by a diffusion of sterile air at high velocity, said end of the cubicle being formed by a wall comprising at least one porous zone (302) made of a perforated material extending over the entire width of said cubicle and rising from the lower edge of said cubicle to a certain determined height.

DEVICE FOR DIFFUSING STERILE AIR

The present invention relates in general to the close protection of a work station situated in a contaminated atmosphere, and more particularly to a device for the close protection of products which are sensitive to contamination by contaminating agents conveyed by the ambient environment, said products being positioned on a worktop such as a conveyor.

10

The invention finds a particularly advantageous application in the field of the agro-foodstuff or pharmaceutical industry where the products are generally sensitive to the contamination conveyed by the ambient environment during their manufacture, and while they are being transported on a conveyor prior to their packaging.

15

Such a device according to the invention makes it possible in particular to protect an individual worktop for manufacturing and/or transporting sensitive products such as these, such as a conveyor on which said products are positioned, by diffusing a stream of sterile air in a direction substantially perpendicular or parallel to said conveyor, said device extending along said conveyor.

20

25

In certain cases, it may happen that the aforesaid device for close protection has at least one end adjoining a wall so that there is an air gap between said wall and said end.

30

This wall is for example an outlet wall of a machine such as an oven, rising vertically and having an aperture opening onto said worktop protected by the protection device.

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This wall can also be an end wall of another similar device for close protection, abutted with said protection device without mechanical fixing, so as to constitute therewith an assembly for the close
5 protection of a worktop of large length.

The ends of an already-known protection device such as this are generally closed by leaktight walls, and the air gap created between said wall and said adjoining
10 end of the device constitutes a risk zone where inductions of contaminated ambient air may occur. The induction of contaminated ambient air produced by suction, consists of a flow of contaminated air directed toward the worktop where the sensitive
15 products are arranged. This contaminated air flow then mixes with the sterile air stream diffused by the protection device and pollutes it.

To alleviate this drawback, the present invention
20 proposes a novel device for the close protection of products arranged on a worktop such as a conveyor, which are sensitive to contamination from the ambient environment, by diffusion of a sterile air stream in a direction substantially perpendicular or parallel to
25 said worktop, said device extending along said worktop and having at least one end adjoining a wall so that there is an air gap between said end and said wall, characterized in that said end is formed by a porous wall made of a perforated material, extending
30 substantially perpendicularly to the longitudinal axis of said device, in such a way as to create in said gap a sterile air leakage directed outward away from the worktop, this sterile air leakage countering any ambient air induction into said gap toward said
35 worktop.

According to other advantageous and nonlimiting characteristics of the invention:

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- a) the device comprises a sheath made of a flexible material diffusing a sterile air stream in a vertical direction substantially perpendicular to said worktop, said sheath being formed of a quasi-leaktight upper wall and of a porous lower wall made of a perforated flexible material, extending longitudinally along the axis of the sheath and delimiting between them a sterile air supply duct, and said end of the sheath being formed by a porous wall made of a perforated flexible material;
- b) said end wall and the porous lower longitudinal wall of the sheath are made from a material of like porosity;
- c) the perforated flexible material constituting the porous lower longitudinal wall and said end wall of the sheath is a synthetic fabric such as a polypropylene or polyester fabric;
- d) each longitudinal edge of the upper longitudinal wall of said sheath is continued by a skirt which extends vertically toward the worktop and which constitutes a means of diffusion of sterile air at high velocity relative to the porous lower longitudinal wall of the sheath which diffuses the sterile air at low velocity;
- e) the device comprises a plurality of sheaths made of a flexible material, juxtaposed so that their axes are parallel and arranged in one and the same plane parallel to the worktop, said sheaths covering the entire width of said worktop. According to a preferred variant of this device the external longitudinal edge of the quasi-leaktight upper wall of the sheath situated at each end of the juxtaposition of sheaths, is

continued by a skirt which extends vertically toward the worktop and which constitutes a means of diffusion of sterile air at high velocity relative to the porous lower walls;

5

f) the two skirts of the sheath or of the juxtaposition of sheaths are of the same length and extend up to the immediate proximity of the worktop;

10

g) the two skirts of the sheath or of the juxtaposition of sheaths have different lengths, a long skirt whose length is approximately equal to the height allowed for between the axis of the sheath and the worktop and a short skirt whose length is approximately equal to half the length of the long skirt;

15

h) the device comprises at least one ventilation nozzle arranged on a longitudinal edge of said worktop and able to produce directed toward said products a sterile air stream in a horizontal general direction substantially parallel to said worktop, said ventilation nozzle comprising at its outlet an air diffuser made of a perforated material provided with upper and lower parts which produce an anti-inductive air flow whose velocity of diffusion exhibits a component normal to the worktop, said end of said ventilation nozzle being formed by a wall made of a perforated material;

20

25

30

i) said end wall of the ventilation nozzle and the upper part and lower part of the air diffuser are made from perforated sheet of like porosity;

35

j) the ventilation nozzle comprises at the level of said porous end, on its upper surface extending horizontally up to its outlet, a strip of

perforated material forming a sterile air flow directed essentially vertically away from the worktop;

- 5 k) the device consists of a cubicle positioned above the worktop, supplied with sterile air and having a porous lower wall for diffusing sterile air in a vertical direction substantially perpendicular to the worktop, said porous wall being made of
10 perforated sheet and exhibiting a profile such that it ensures central diffusion of sterile air at low velocity bordered on each side by a diffusion of sterile air at high velocity, said end of the cubicle being formed by a wall
15 comprising at least one porous zone made of a perforated material extending over the entire width of said cubicle and rising from the lower edge of said cubicle to a certain determined height.

- 20 The invention also proposes an assembly for the close protection of products arranged on a worktop such as a conveyor, which are sensitive to the contamination conveyed by the ambient environment, characterized in
25 that it comprises a device according to the invention as defined in characteristics a) to f) and at the extremity of said device, at least one ventilation nozzle arranged on a longitudinal edge of said worktop, able to produce directed toward said products a sterile
30 air stream in a horizontal general direction substantially parallel to said worktop, said ventilation nozzle comprising at its outlet an air diffuser made of perforated material comprising upper and lower parts which produce an anti-inductive air
35 flow whose velocity of diffusion exhibits a component normal to the worktop, said device furthermore comprising at the junction with said ventilation nozzle a vertical end skirt extending in a plane perpendicular

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to the planes of the lateral skirts of said sheath, directed toward said worktop up to a determined distance therefrom so as to permit the passage of said products under said end skirt.

5

It further proposes an assembly for the close protection of products arranged on a worktop such as a conveyor, which are sensitive to the contamination conveyed by the ambient environment, characterized in that it comprises a device according to the invention as defined in characteristics a) to e) and g) and at the extremity of said device, at least one ventilation nozzle arranged on a longitudinal edge of said worktop, able to produce directed toward said products a sterile air stream in a horizontal general direction substantially parallel to said worktop, said ventilation nozzle comprising at its outlet an air diffuser made of perforated material comprising upper and lower parts which produce an anti-inductive air flow whose velocity of diffusion exhibits a component normal to the worktop, said device furthermore comprising at the junction with said ventilation nozzle a vertical end skirt extending in a plane perpendicular to the planes of the lateral skirts of said sheath, directed toward said worktop up to a determined distance therefrom so as to permit the passage of said products under said end skirt.

The description which follows in conjunction with the appended drawings given by way of nonlimiting examples will elucidate the gist of the invention and the manner in which it may be embodied.

In the appended drawings:

- 35 - figure 1 is a sectional diagrammatic view along A-A of the device of figure 2,
- figure 2 is a front diagrammatic view of a first embodiment of a device according to the invention,

- figure 3 is a view of a detail of an end of the device of figure 4,
- figure 4 is a perspective diagrammatic view of a second embodiment of the device according to the invention,
- figure 5 is a front view of an assembly for close protection according to the invention,
- figure 6 is a front view of another assembly for close protection according to the invention, and
- figure 7 is a longitudinal sectional view of a third embodiment according to the invention.

It will firstly be noted that elements which are identical or similar in the various embodiments represented will so far as possible be referenced by the same reference signs from one figure to another and will not be described each time.

Represented in figures 1 and 2 is a first embodiment of a device for the close protection of products arranged on a worktop 12 such as a conveyor, which are sensitive to contamination conveyed by the ambient environment. The worktop 12 rests on the ground by way of a foot 13.

This device 100 comprises a plurality of sheaths of flexible material 101, 102, 103, here three in number, juxtaposed above the worktop 12, along a direction transverse to the longitudinal edges of the worktop 12, in such a way that the X axes of the sheaths 101, 102, 103 are parallel and extend in one and the same plane parallel to the worktop 12.

The three juxtaposed sheaths 101, 102, 103 cover the width and the length of the worktop 12, and diffuse a stream of sterile air in a vertical direction substantially perpendicular to said worktop 12.

The sheaths are accordingly supplied with sterile air through individual air supply ducts (not represented) which open out in a leaktight manner into the sheaths through the topside of said sheaths.

5

The three identical sheaths 101, 102, 103 will not be described here in detail. They are of the type of those already described in international application WO 97/40325 belonging to the applicant.

10

In particular, each sheath 101, 102, 103 is formed of a semi-cylindrical quasi-leaktight upper wall and of a semi-cylindrical porous lower wall made from a perforated flexible material, extending longitudinally along the axis of the sheath and delimiting between them a cylindrical duct of axis X for supplying sterile air.

15

Furthermore, the external longitudinal edge of the quasi-leaktight upper wall of the sheath 101, 103 situated at each end of the juxtaposition of sheaths, is continued by a skirt 104, 105 which extends vertically toward the worktop and which constitutes a means of diffusing sterile air at high velocity (demarcated by the arrows v in figure 2) with respect to the porous lower walls of said sheaths which diffuse the sterile air at low velocity (demarcated by the arrows v in figure 2).

20

25

The mean velocity of the sterile air exiting the porous walls of the sheaths is of the order of 0.4 m/s.

30

According to the embodiment represented in figures 1 and 2 the two skirts 104, 105 are of the same length and extend up to the immediate proximity of the worktop.

35

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According to a variant represented in figure 6, provision may be made for the two skirts 104, 105 to have different lengths, a long skirt 104 whose length is approximately equal to the height allowed for
5 between the X axis of the sheath 101 and the worktop 12 and a short skirt 105 whose length is approximately equal to half the length of the long skirt 104.

Furthermore, each sheath 101, 102, 103 comprises an end
10 102a adjoining an outlet wall 10 of a machine, for example an oven, comprising an aperture 11 opening onto the worktop 12. This wall 10 rises vertically from ground and is taller than said sheaths.

15 Said ends of the sheaths 101, 102, 103 being made with discs of flat fabric, they adopt a domed shape under the pressure of the sterile air flowing in said sheaths.

20 There is then an air gap 1 between said ends of the sheaths 101, 102, 103 and the wall 10, and more particularly between the ends of the lateral skirts 104, 105 and the wall 10. This air gap 1 is around 30 to 35 mm.

25 To avoid any induction of contaminated air into said gap 1, each end 102a of each sheath 102 is formed by a porous wall made of a perforated flexible material.

30 A sterile air leakage directed outward away from the worktop 12 is thus created in said gap 1, this sterile air leakage countering any induction of ambient air into said gap 1 toward said worktop 12.

35 Said end wall 102a and the porous lower longitudinal wall of the sheath are made from a material of like porosity.

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For worktops or conveyors of large length, there may be good cause to prolong each of the three juxtaposed flexible sheaths by abutting another similar sheath 102 with each sheath 102 aligned therewith (see figure 1).

10 The two aligned sheaths 102 have no mechanical fixing therebetween.

Thus, the other end 102b of each of the three juxtaposed sheaths, which is situated away from the end 102a adjoining the machine outlet wall 10, adjoins an end wall 102a of the other similar sheath 102.

An air gap 1 is then also created between the two end walls 102b, 102a adjoining the two abutting sheaths.

20

To avoid any induction of contaminated ambient air into this gap 1, one of the two adjoining ends 102a, 102b of the two aligned sheaths 102, is formed of a porous wall made of a perforated flexible material, for example of the type of that constituting the porous lower longitudinal wall of each sheath. Specifically, a leakage of sterile air outward away from the worktop is created through this porous end wall, countering any induction of contaminated air into said air gap 1.

30

Provision may also be made for the two adjoining end walls 102a, 102b of the two aligned sheaths 102 to be formed by porous walls made of a perforated flexible material. Two leakages of sterile air outward away from the worktop 1 are thus created in said air gap 1, countering any induction of contaminated air thereinto.

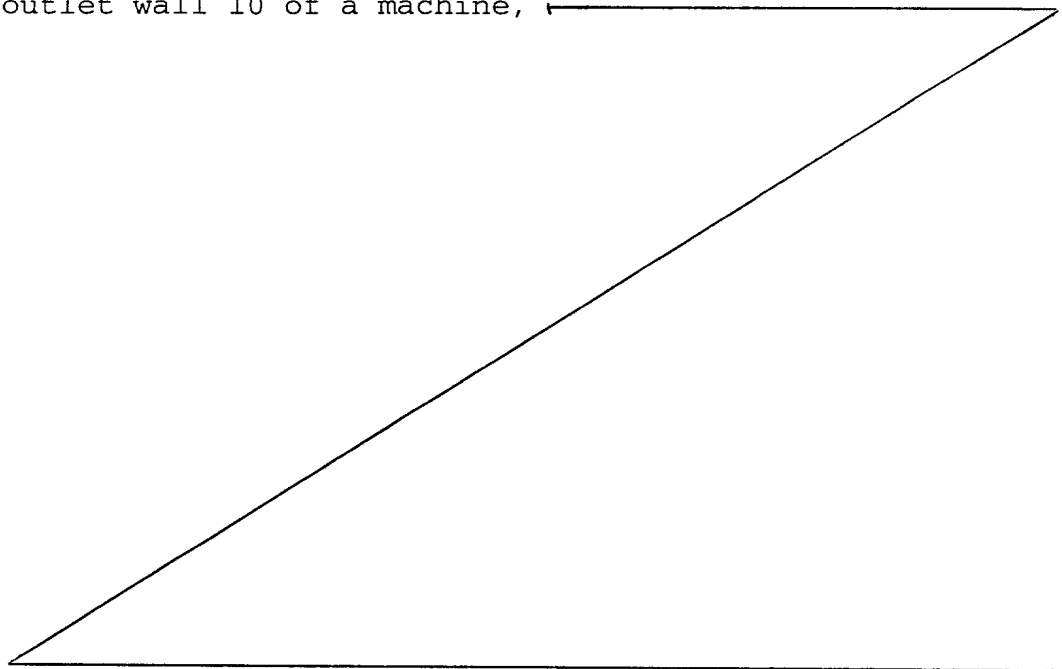
Represented in figure 4 is a second embodiment of a device 200 for the close protection of products arranged on a worktop such as a conveyor 12, which are sensitive to contamination by the ambient environment.

5

This device 200 comprises on each longitudinal edge of said worktop 12, two abutting ventilation nozzles 201 able to produce directed toward the sensitive products, a stream of sterile air in a horizontal general
10 direction v substantially parallel to said worktop 12 (see figure 4).

As shown more particularly by figure 3, each ventilation nozzle 201 comprising at its outlet an air
15 diffuser 202 made of a perforated material comprising upper 202a and lower 202b parts which produce an anti-inductive air flow whose velocity of diffusion exhibits a component normal to the worktop 12.

20 On each longitudinal edge of the worktop 12, a ventilation nozzle 201 has an end 201a adjoining an outlet wall 10 of a machine,



This porous end setup makes it possible to create a leakage of sterile air outward away from the worktop, countering any induction of contaminated air into said air gap 1.

5

Moreover on each longitudinal edge of the conveyor 12, at the junction of the two abutting ventilation nozzles 201, there is an air gap 1 of a few millimeters between the two ends 201b of said nozzles.

10

To likewise avoid any phenomenon of induction of contaminated air into this air gap 1, one of the ventilation nozzles 201 comprises a porous end 201b and at the level of this porous end on its upper surface extending horizontally up to its outlet, a strip 201c of perforated material (see figure 3). The porous end 201b and said perforated strip 201c form a flow of sterile air directed essentially vertically away from the worktop 12.

15

The perforated strip 201c here has a width of 2 cm and a length of 10 cm.

Represented in figure 5 is an assembly for the close protection of products P arranged on a worktop 12 such as a conveyor, which are sensitive to the contamination conveyed by the ambient environment, which comprises a protection device 100 consisting of juxtaposed sheaths 101, 102, 103 made of flexible material, identical to the device represented in figure 2 and at the extremity of this device, a ventilation nozzle 201 arranged on each longitudinal edge of said worktop 12, able to produce directed toward said products P a stream of sterile air in a horizontal general direction substantially parallel to said worktop, each ventilation nozzle comprising at its outlet an air diffuser made of perforated material comprising upper and lower parts which produce an anti-inductive air

In this assembly, there are provided, as represented in figure 2, on either side of said sheaths, vertical skirts 104, 105 having identical lengths. The skirts extend here from the axis of the sheaths up to the longitudinal edges of the conveyor 12.

Moreover, each end of each skirt 104, 105 placed at the junction with the ventilation nozzles 201, is formed by a porous wall of perforated flexible material of the same type as that constituting the porous lower longitudinal walls of said sheaths.

The ends of the ventilation nozzles 201 are for their part made from a completely leaktight solid sheet.

This setup makes it possible to avoid any induction of contaminated air into the gap 1 created between the skirts and the ventilation nozzles. This gap is of the order of 20 mm taken between the vertical lateral skirts and the nozzles.

Represented in figure 6 is a variant of the assembly for close protection of figure 5, according to which there are provided, on either side of the juxtaposed flexible sheaths 101, 102, 103, vertical skirts of different lengths, a long skirt 104 whose length is approximately equal to the height allowed for between the axis of the sheaths and the worktop and a short skirt 105 whose length is approximately equal to half the length of the long skirt.

There is moreover provided a vertical end skirt 106 extending in front of the ends of the sheaths, from the

axes of said sheaths, in a plane perpendicular to the
planes of the vertical lateral skirts 104, 105,
directed toward said worktop 12 up to a determined
distance from the latter so as to allow the passage of
5 said products under said end skirt 106.

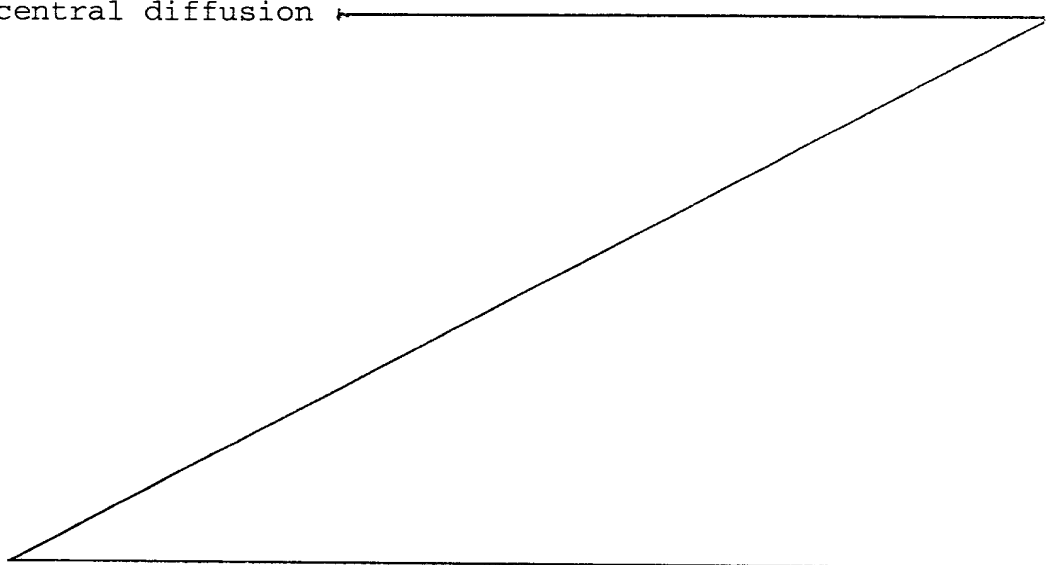
The ends of said sheaths remain porous walls and the
ends of the ventilation nozzles situated on the sheaths
side remain leaktight.

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This novel setup makes it possible to avoid any
induction of contaminated air into the gap 1 created
between the sheaths and the ventilation nozzles,
especially on the short lateral skirt 105 side.

15

Represented in figure 7 is a cubicle 300 positioned
above the worktop 12, supplied with sterile air through
a duct 303 which opens into the cubicle through its
leaktight upper wall. This cubicle 300 has a porous
20 lower wall 301 for diffusing sterile air in a vertical
direction substantially perpendicular to the worktop
12, said porous wall 301 being made from perforated
sheet and exhibiting a profile such that it ensures a
central diffusion



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The end of the second cubicle 300 which adjoins the
leaktight end of the first cubicle 300 comprises a
porous zone 302 made of perforated material extending
over the width of said cubicle 300 and rising from the
5 lower edge of said cubicle to a certain determined
height here of the order of 25 mm.

The porosity of the porous zone 302 of the ends of the
lower walls for diffusing sterile air 301 of the
10 cubicles 300, are in this typical case identical.

These end setups of the cubicles also make it possible
to avoid inductions of contaminated air into the air
gaps 1 created between the wall 10 and the first
15 cubicle and between the two ends of the abutting
cubicles, by creating air leakages directed outward
away from the worktop 12, countering the flow of
incoming air.

20 In general, the quality of the air in respect of the
worktop and in respect of the various embodiments
described earlier of the protection device according to
the invention, at the junction of the ends of this
device with various wall types, is class 10 for $0.3\ \mu\text{m}$
25 particles, this being a guarantee of a sterile ambient
environment, in particular according to the standard US
Fed Std 209 E of 1992.

The present invention is in no way limited to the
30 embodiments described and represented, but the person
skilled in the art will be able to provide any variant
thereof in accordance with the spirit thereof.

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- 16 -

CLAIMS

1. An installation comprising a worktop such as a conveyor, a first wall and a device (100) for the close protection of products arranged on the worktop (12), which are sensitive to contamination from the ambient environment, by diffusion of a sterile air stream in a direction substantially perpendicular or parallel to said worktop, said device extending along said worktop and having at least one end adjoining the first wall (10) so that there is an air gap (1) between said end and said first wall, characterized in that said end is formed by a porous second wall made of a perforated material, extending substantially perpendicularly to the longitudinal axis (X) of said device, in such a way as to create in said gap (1) a sterile air leakage directed outward away from the worktop (12), this sterile air leakage countering any ambient air induction into said gap toward said worktop.
2. The installation as claimed in claim 1, characterized in that said first wall (10) is a machine outlet wall provided with an aperture opening onto the worktop.
3. The installation as claimed in one of claims 1 or 2, characterized in that said first wall is an end wall of another similar device with which it forms a set of devices for the close protection of products arranged on a worktop of large length, which are sensitive to the contamination conveyed by the ambient environment, said devices being abutted without mechanical fixing therebetween.

4. The installation as claimed in claim 3, characterized in that said first wall is a porous wall made of a perforated material through which is created a sterile air leakage directed outward away from said worktop.
5. The installation as claimed in any one of claims 1 to 4, characterized in that it comprises at least one sheath (101, 102, 103) made of a flexible material diffusing a sterile air stream in a vertical direction substantially perpendicular to said worktop (12), said sheath being formed of a quasi-leaktight upper wall and of a porous lower wall made of a perforated flexible material, extending longitudinally along the axis (X) of the sheath and delimiting between them a sterile air supply duct, and the sheath having an end formed by a porous wall made of a perforated flexible material.
6. The installation as claimed in claim 5, characterized in that said end wall and the porous lower longitudinal wall of the sheath are made from a material of like porosity.
7. The installation as claimed in one of claims 5 or 6, characterized in that the perforated flexible material constituting the porous lower longitudinal wall and said end wall of the sheath is a synthetic fabric such as a polypropylene or polyester fabric.
8. The installation as claimed in one of claims 5 to 7, characterized in that each longitudinal edge of the quasi-leaktight upper longitudinal wall of said sheath is continued by a skirt (104, 105) which extends vertically toward the worktop (12)

and which constitutes a means of diffusion of sterile air at high velocity relative to the porous lower longitudinal wall of the sheath which diffuses the sterile air at low velocity.

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9. The installation as claimed in any one of claims 5 to 7, characterized in that it comprises a plurality of sheaths (101, 102, 103) made of a flexible material, juxtaposed so that their axes (X) are parallel and arranged in one and the same plane parallel to the worktop, said sheaths (101, 102, 103) covering the entire width of said worktop (12).

10. The installation as claimed in claim 9, characterized in that the external longitudinal edge of the quasi-leaktight upper wall of the sheath (101, 103) situated at each end of the juxtaposition of sheaths, is continued by a skirt (104, 105) which extends vertically toward the worktop (12) and which constitutes a means of diffusion of sterile air at high velocity relative to the porous lower walls of said sheaths which diffuse the sterile air at low velocity.

25

11. The installation as claimed in one of claims 8 or 10, characterized in that the two skirts (104, 105) are of the same length and extend up to the immediate proximity of the worktop.

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12. The installation as claimed in one of claims 8 or 10, characterized in that the two skirts (104, 105) have different lengths and form a long skirt (104) whose length is approximately equal to the height allowed for between the axis of the sheath and the worktop and a short skirt (105) whose length is approximately equal to half the length

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of the long skirt.

13. The installation (200) as claimed in any one of claims 1 to 4, characterized in that it comprises at least one ventilation nozzle (201) arranged on a longitudinal edge of said worktop (12) and able to produce directed toward said products a sterile air stream in a horizontal general direction substantially parallel to said worktop, said ventilation nozzle (201) comprising at its outlet an air diffuser (202) made of a perforated material provided with upper and lower parts which produce an anti-inductive air flow whose velocity of diffusion exhibits a component normal to the worktop, said end (201a, 201b) of said ventilation nozzle being formed by a wall made of a perforated material.
14. The installation as claimed in claim 13, characterized in that said end wall (201a, 201b) of the ventilation nozzle and the upper part (202a) and lower part (202b) of the air diffuser (202) are made from perforated sheet of like porosity.
15. The installation as claimed in one of claims 13 or 14, characterized in that the ventilation nozzle comprises at the level of said porous end (201b), on its upper surface extending horizontally up to its outlet, a strip (201c) of perforated material forming a sterile air flow directed essentially vertically away from the worktop.
16. An assembly for the close protection of products arranged on a worktop such as a conveyor, which are sensitive to the contamination conveyed by the ambient environment, characterized in that it

comprises an installation (100) according to claim 11 and at an extremity of said device, at least one ventilation nozzle (201) arranged on a longitudinal edge of said worktop, able to produce directed toward said products a sterile air stream in a horizontal general direction substantially parallel to said worktop, said ventilation nozzle comprising at its outlet an air diffuser made of perforated material comprising upper and lower parts which produce an anti-inductive air flow whose velocity of diffusion exhibits a component normal to the worktop, said device furthermore comprising at the junction with said ventilation nozzle a vertical end skirt extending in a plane perpendicular to the planes of the lateral skirts of said sheath, directed toward said worktop up to a determined distance therefrom so as to permit the passage of said products under said end skirt.

17. An assembly for the close protection of products arranged on a worktop such as a conveyor, which are sensitive to the contamination conveyed by the ambient environment, characterized in that it comprises an installation (100) according to claim 12 and at an extremity of said device, at least one ventilation nozzle (201) arranged on a longitudinal edge of said worktop, able to produce directed toward said products a sterile air stream in a horizontal general direction substantially parallel to said worktop, said ventilation nozzle comprising at its outlet an air diffuser made of perforated material comprising upper and lower parts which produce an anti-inductive air flow whose velocity of diffusion exhibits a component normal to the worktop, said device furthermore comprising at the junction with said ventilation nozzle a vertical end skirt extending in a plane

perpendicular to the planes of the lateral skirts of said sheath, directed toward said worktop up to a determined distance therefrom so as to permit the passage of said products under said end skirt.

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18. The installation as claimed in one of claims 1 to 4, characterized in that it comprises a cubicle (300) positioned above the worktop (12), supplied with sterile air and having a porous lower wall (301) for diffusing sterile air in a vertical direction substantially perpendicular to the worktop (12), said porous wall being made of perforated sheet and exhibiting a profile such that it ensures central diffusion of sterile air at low velocity bordered on each side by a diffusion of sterile air at high velocity, said end of the cubicle being formed by a wall comprising at least one porous zone (302) made of a perforated material extending over the entire width of said cubicle and rising from the lower edge of said cubicle to a certain determined height.

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19. The installation as claimed in claim 18, characterized in that said height is of the order of 25 mm.

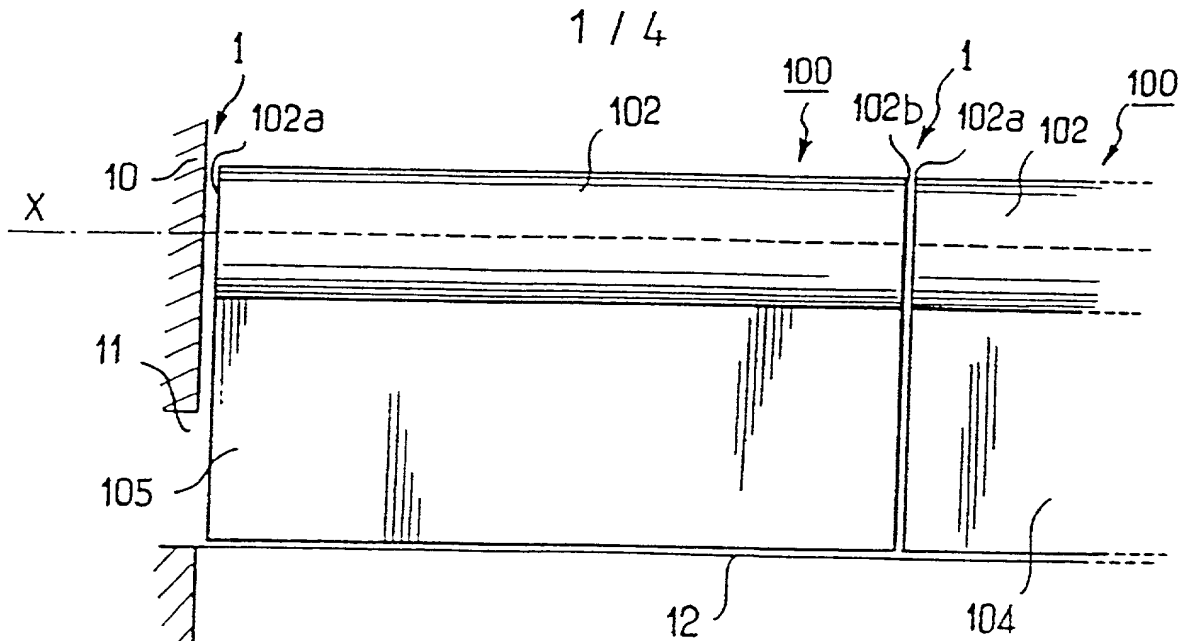


FIG. 1

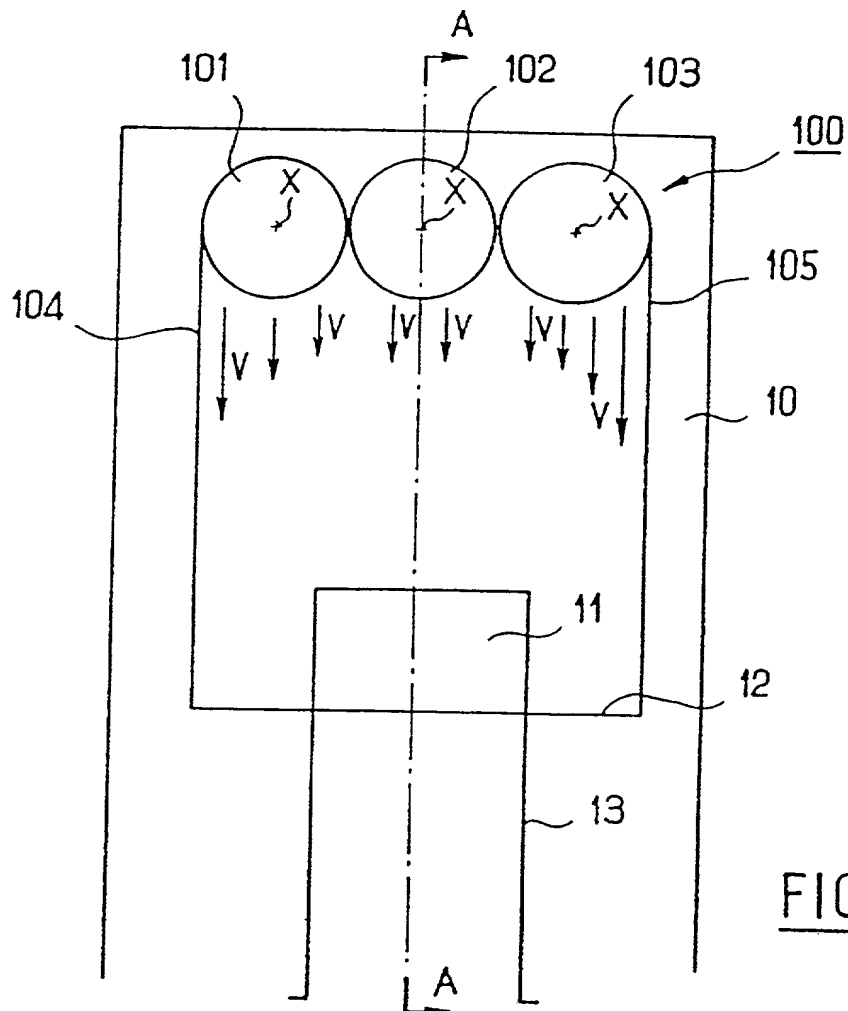
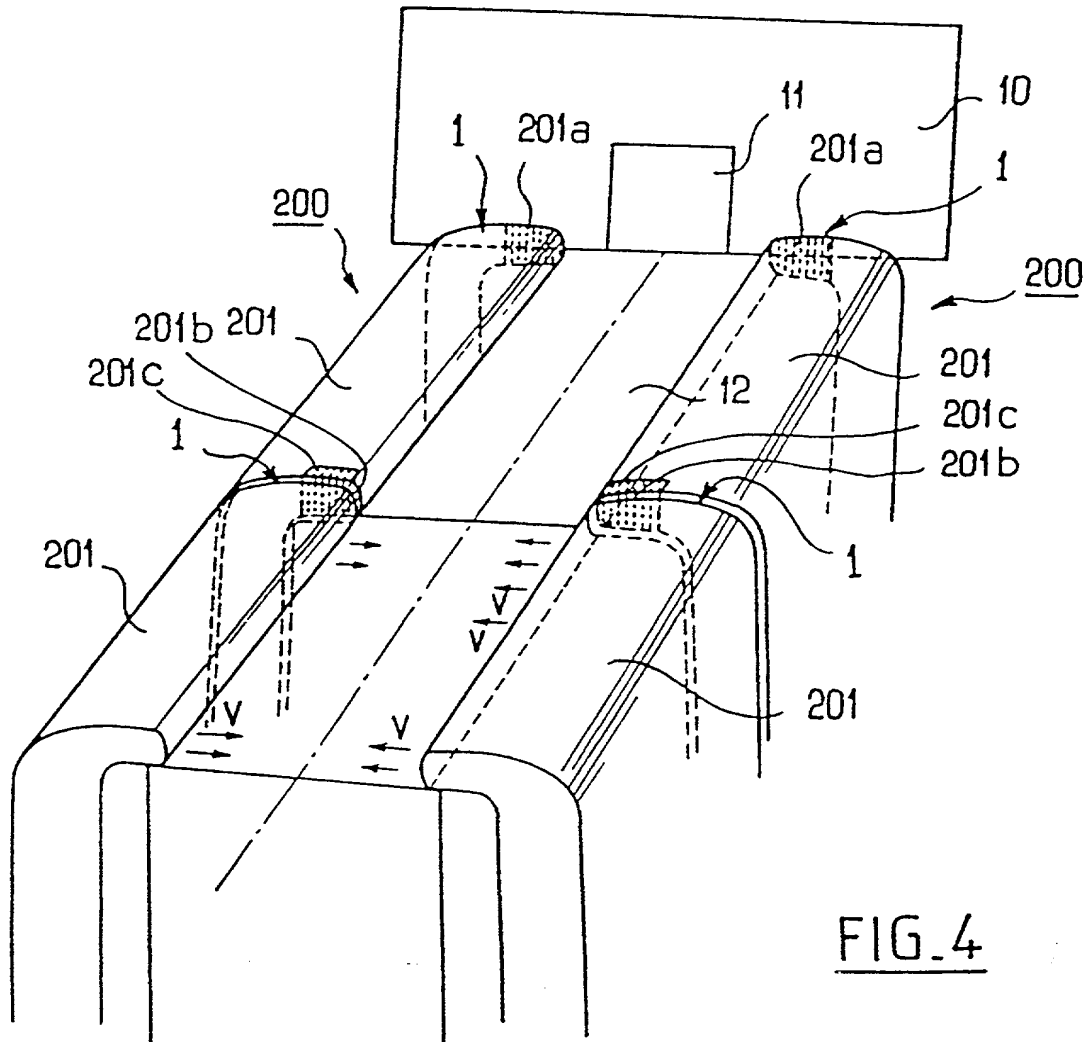
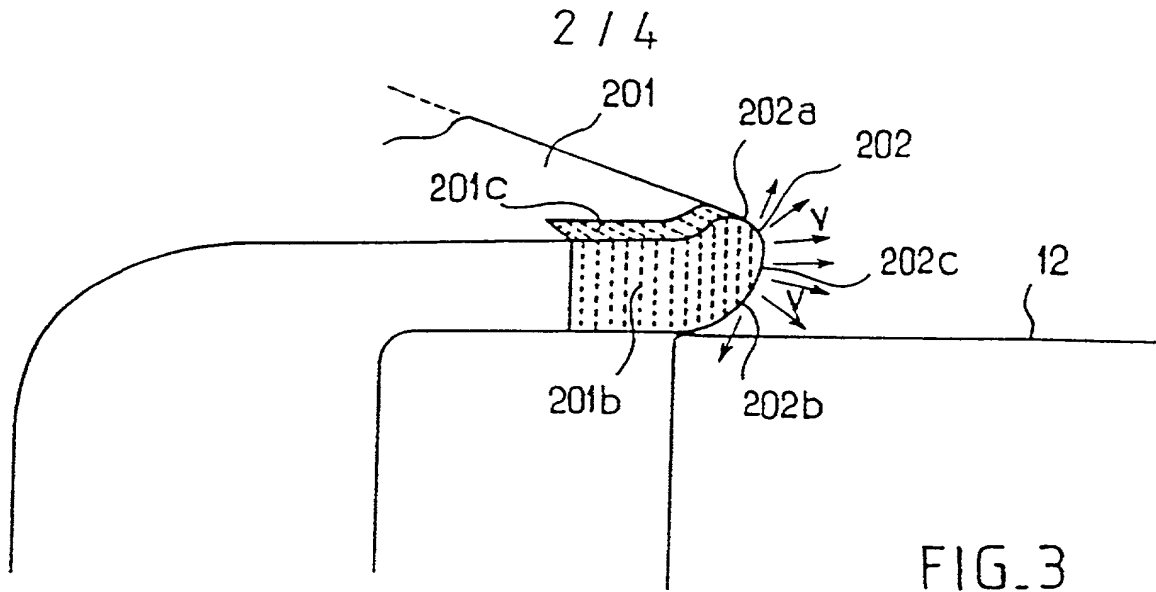
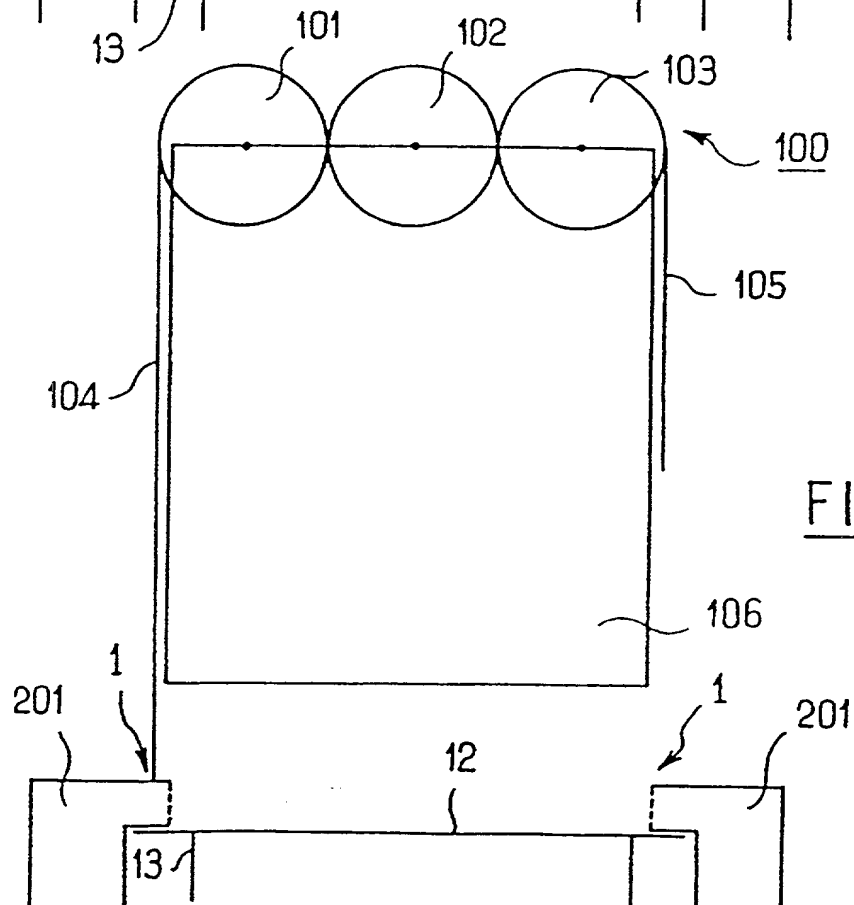
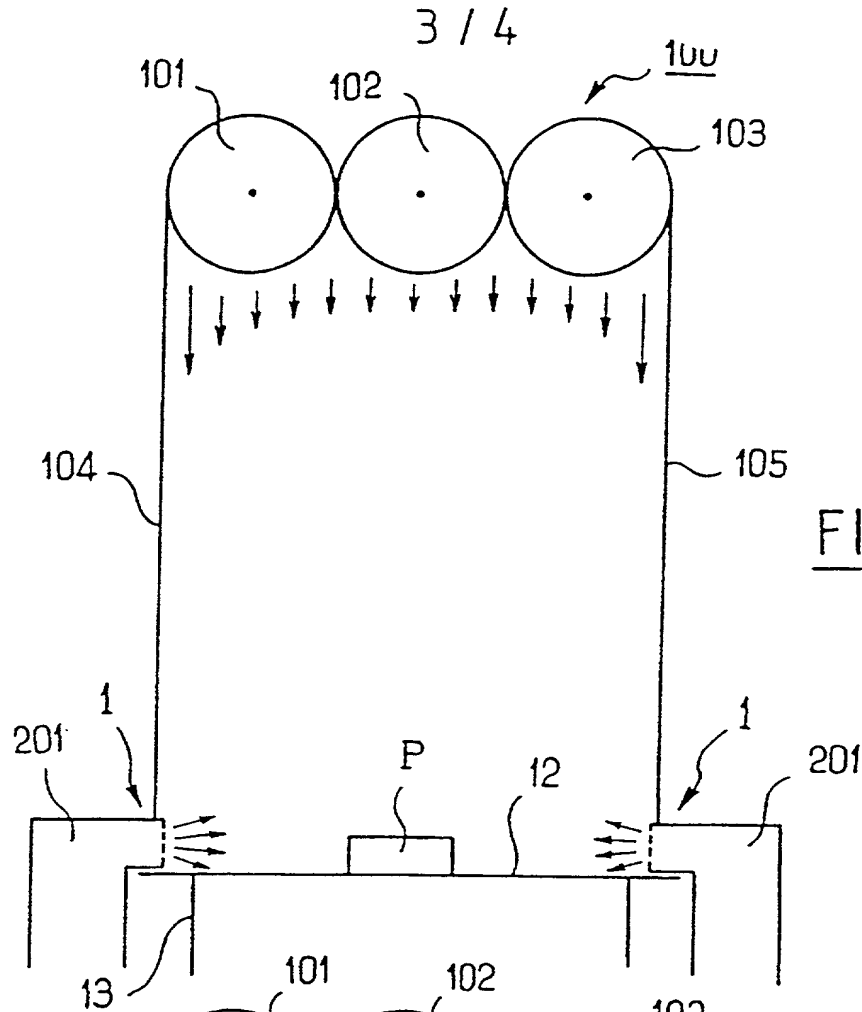


FIG. 2





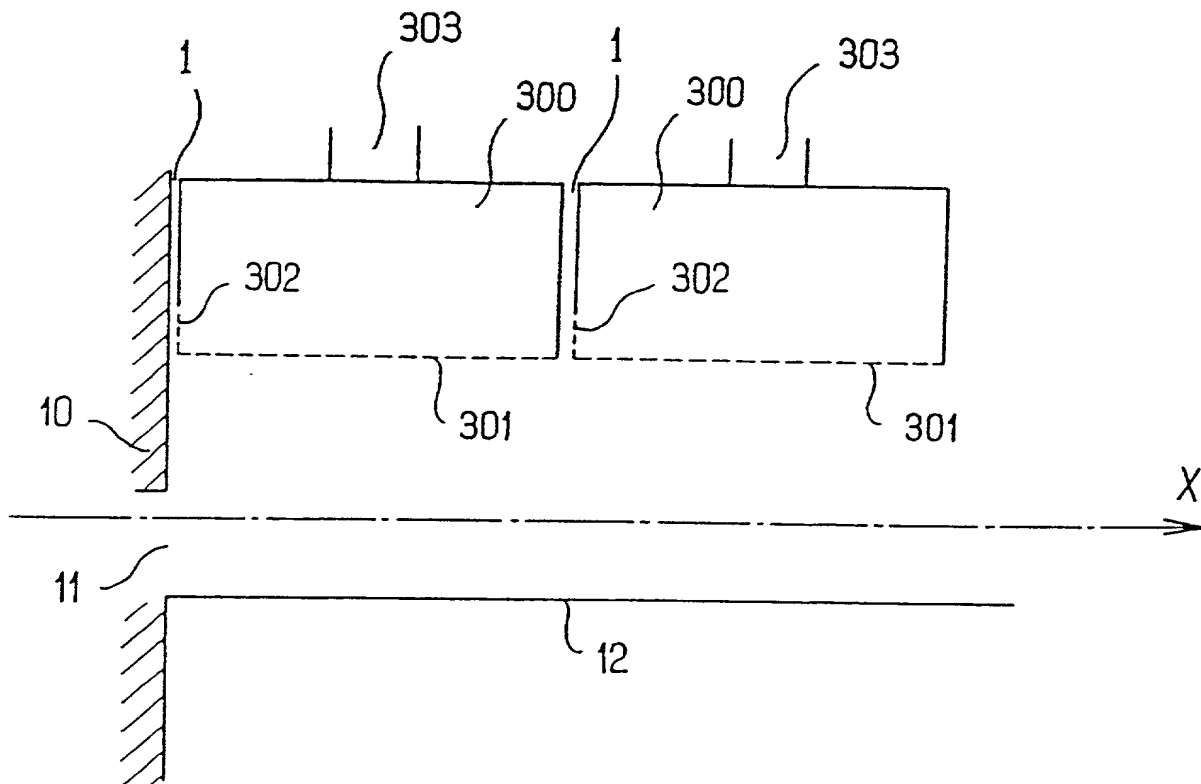


FIG. 7

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I HEREBY DECLARE:

THAT my residence, post office address, and citizenship are as stated below next to my name;

THAT I believe I am the original, first, and sole inventor (if only one inventor is named below) or an original, first, and joint inventor (if plural inventors are named below or in an attached Declaration) of the subject matter which is claimed and for which a patent is sought on the invention entitled

DEVICE FOR DIFFUSING STERILE AIR

(Attorney Docket No. 065691-0245)

the specification of which (check one)

 is attached hereto;

 X was filed on January 25, 2000 as United States Application Number or PCT International Application Number PCT/FR00/00161 and was amended on (if applicable).

THAT I do not know and do not believe that the same invention was ever known or used by others in the United States of America, or was patented or described in any printed publication in any country, before I (we) invented it;

THAT I do not know and do not believe that the same invention was patented or described in any printed publication in any country, or in public use or on sale in the United States of America, for more than one year prior to the filing date of this United States application;

THAT I do not know and do not believe that the same invention was first patented or made the subject of an inventor's certificate that issued in any country foreign to the United States of America before the filing date of this United States application if the foreign application was filed by me (us), or by my (our) legal representatives or assigns, more than twelve months (six months for design patents) prior to the filing date of this United States application;

THAT I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment specifically referred to above;

THAT I believe that the above-identified specification contains a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention, and sets forth the best mode contemplated by me of carrying out the invention; and

THAT I acknowledge the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I HEREBY CLAIM foreign priority benefits under Title 35, United States Code §119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below any foreign application for patent or inventor's certificate or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number	Country	Foreign Filing Date	Priority Claimed?	Certified Copy Attached?
99/00.817	France	January 26, 1999	yes	

I HEREBY CLAIM the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below.

U.S. Provisional Application Number	Filing Date

I HEREBY CLAIM the benefit under Title 35, United States Code, §120 of any United States application(s), or § 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application Number	PCT Parent Application Number	Parent Filing Date	Parent Patent Number

I HEREBY APPOINT the following registered attorneys and agents of the law firm of FOLEY & LARDNER:

STEPHEN A. BENT	Reg. No. <u>29,768</u>
DAVID A. BLUMENTHAL	Reg. No. <u>26,257</u>
BETH A. BURROUS	Reg. No. <u>35,087</u>
ALAN I. CANTOR	Reg. No. <u>28,163</u>
WILLIAM T. ELLIS	Reg. No. <u>26,874</u>
JOHN J. FELDHAUS	Reg. No. <u>28,822</u>
MICHAEL D. KAMINSKI	Reg. No. <u>32,904</u>
LYLE K. KIMMS	Reg. No. <u>34,079</u>
KENNETH E. KROSIN	Reg. No. <u>25,735</u>

24

JOHNNY A. KUMAR	Reg. No. 34,649
JACK LAHR	Reg. No. 19,621
GLENN LAW	Reg. No. 34,371
PETER G. MACK	Reg. No. 26,001
STEPHEN B. MAEBIUS	Reg. No. 35,264
BRIAN J. MC NAMARA	Reg. No. 32,789
SYBIL MELOY	Reg. No. 22,749
RICHARD C. PEET	Reg. No. 35,792
GEORGE E. QUILLIN	Reg. No. 32,792
ANDREW E. RAWLINS	Reg. No. 34,702
BERNHARD D. SAXE	Reg. No. 28,665
CHARLES F. SCHILL	Reg. No. 27,590
RICHARD L. SCHWAAF	Reg. No. 25,479
MICHELE M. SIMKIN	Reg. No. 34,717
HAROLD C. WEGNER	Reg. No. 25,258

to have full power to prosecute this application and any continuations, divisions, reissues, and reexaminations thereof, to receive the patent, and to transact all business in the United States Patent and Trademark Office connected therewith.

I request that all correspondence be directed to:

Stephen B. Maebius
~~FOLEY & LARDNER~~
 Washington Harbour
 3000 K Street, N.W., Suite 500
 Washington, D.C. 20007-5109

Telephone: (202) 672-5569
 Facsimile: (202) 672-5399

I UNDERSTAND AND AGREE THAT the foregoing attorneys and agents appointed by me to prosecute this application do not personally represent me or my legal interests, but instead represent the interests of the legal owner(s) of the invention described in this application.

I FURTHER DECLARE THAT all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Name of first inventor Didier Beudon

Residence Rambouillet, France *FRX*

Citizenship France

Post Office Address 97, rue Patenotre
Rambouillet F-78120 France

Inventor's signature *[Signature]*

Date 16.01.02

20
Name of second inventor

Pierre Bridenne

Residence

Forges-les-Bains, France *FR*

Citizenship

France

Post Office Address

5, allée des Ecureuils
Forges-les-Bains F-75116 France

Inventor's signature

Date

[Signature]
16 JAN 2002